NWX-DISEASE CONTROL & PREVENTI

Moderator: Dale Babcock
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Coordinator: Welcome, and thank you for standing by. At this time, all lines are on a listen-only mode. During our Q&A session, you may press Star 1 on your touchtone phone if you would like to ask a question. This conference is being recording. If you have any objections, you may disconnect at this time.

Now I'd like to turn the meeting over to Dr. (Raymond Strikas). Sir, you may begin.

(Raymond Strikas): Thank you very much, and welcome to Current Issues in Immunizations Net Conferences, produced by the Immunization Services Division at the National Center for Immunization and Respiratory Diseases at the Centers for Disease Control and Prevention in Atlanta, Georgia.

For today's program, you need to have both a separate telephone connection and a different Internet connection to access both the audio and the visual portions of the program.

Learning objectives for today are:

For you to be able to describe at least one emerging immunization issue.
2) To list a recent immunization recommendation made by the Advisory Committee on Immunization Practices;
3) To locate resources relevant to ~~a~~ current immunization practice; and
4) Obtain, assess and apply patient information to determine the need for immunization.

Today's program which is part of the Epidemiology and Prevention of Vaccine-preventable Diseases Webinar series - also known as the pink book - will cover measles, mumps, rubella diseases and vaccines and will be presented by Donna Weaver, Masters of Nursing and Registered Nurse - one of our nurse-educators at the CDC.

Please make a note - if you have any technical difficulties, you can dial Star 0 on your telephone, and when we reach the question-and-answer session at the end of the presentation, you may dial Star 1 to enter the queue for question at that time.

Continuing education - or CE credit - is available only through the CDC ATSDR training and continuing education online system at www2a.cdc.gov/TCEOnline/, which you see on your screen now.

The CE credit for this program - from today's program - will expire in about a month on October 19, 2015. When obtaining continuing education - or CE, you'll be required to provide a verification code. Please watch and listen for the verification code during the course. I'll present it to you at the end of the presentation. We will not give the code~~s~~ outside of this presentation.

CDC - our planners and our presenters - wish to disclose that we have no financial interests or other relationships with the manufacturers of commercial products, suppliers of commercial services or commercial supporters.

Our presentation will not include any discussion of the unlabeled use of a product or a product under investigational use with the exception of- Ms. Weaver's discussion of use of MMR vaccines in a manner recommended by the Advisory Committee on Immunization Practices but not approved by the Food and Drug Administration - and she'll identify those instances where she talks about those types of usage of this vaccine.

CDC does not accept any commercial support.

Let me turn the program now over to Ms. Weaver.

(Donna Weaver): Thank you, Dr. Strikas, and good afternoon, everyone. It's nice to be here with you again. And as Dr. Strikas mentioned, this week's topic covers three diseases: measles, mumps and rubella and the vaccines that provide protection against them.

It may be a little challenging to follow along with the slides in the Pink Book this week, since we're covering three chapters, and for time's sake, I've abbreviated and consolidated some of the slides and information for these three diseases.

On Monday, we did post a copy of the slides that I'm using, and they will be archived on the Web site for this course. And then the transcript will be posted within a few days.

I'm going to briefly describe the clinical features and epidemiology of each disease and then discuss MMR-containing vaccines and recommendations for their use.

I'll start with measles - which is also known as rubeola, and when I was a child, it was commonly known as red measles. Measles is a very contagious disease caused by a paramyxovirus. Secondary attack rates of more than 90% have been documented. This means that a person with measles will infect almost every susceptible person with whom they have contact.

The nasopharynx - or area of the upper throat behind the nose - is the primary site of infection. And the incubation period - or the time from the moment of exposure until signs and symptoms of the disease appear - is typically 10-to-12 days.

The prodrome - or appearance of early symptoms that indicate the onset of disease - is 2-to-4 days. And this includes a stepwise increase in fever, which can be quite high at 103-to-104 degrees Fahrenheit.

You also hear people talk about the classic 3C's: cough, coryza - or inflammation and congestion of mucous membranes in the nose - and conjunctivitis - or inflammation of the inner surface of the eyelids - typically referred to as "pink eye."

And sometimes Koplik spots can be seen. These are blueish-white lesions with reddish rims on the buccal mucosa - or what has been described as looking like white grains of rice on the inside of the cheeks.

The rash on the body appears 2-to-4 days after the prodrome, and about 14 days after exposure. It typically lasts 5 or 6 days. And the rash is caused by

deposits of measles antibody in the skin, and it may only appear red in lighter-skinned people. The rash is described as maculopapular with small bumps that become confluent - or run-together.

The rash first appears on the face, and during the next 2 or 3 days, it moves to the trunk and then to the arms and legs. And then, as the person recovers, the rash will fade in the order that it appeared.

Now, here's a picture of a child with measles. You can see the maculopapular rash, and his eyelashes and nose also look crusty - which is indicative of conjunctivitis and coryza. And his lips look parched - which likely indicates fever.

You know, I can still remember when I had measles - and that was a long time ago. I had to stay in a dark room for several days, and I developed pneumonia. But back then, almost everyone got measles. And I have a cousin who has very poor vision after having measles as a child.

We don't really see this anymore in the U.S., but measles is a leading cause of blindness among children in low-income countries, because the combination of measles and vitamin A deficiency can damage the eyes.

These are the complications that are associated with measles in the U.S.: diarrhea is the most common, followed by otitis media - or middle ear infection - and pneumonia. Encephalitis -or inflammation of the brain - and seizures are fairly uncommon. And death occurs in about 0.2% of reported cases here in the U.S. - which is about 2 deaths per 1,000 reported cases.

However, measles is the most deadly of all childhood rash/fever illnesses. And there are approximately 146,000 deaths worldwide each year from measles.

Mumps is also caused by a paramyxovirus. It is about as contagious as flu and rubella, but not as contagious as measles or varicella. The primary site of infection is the nasopharynx and lymph nodes in that area. It can then spread to the meninges - or the membranes that envelop the brain and spinal cord. The incubation period ranges between 12 and 25 days.

Mumps can infect several glands in the body, as shown on the slide, but parotitis - or inflammation of the parotid or salivary glands - is what we most often think of. The prodrome is non-specific. And that means that the symptoms of myalgia - or muscle aches, anorexia-or loss of appetite, malaise - or general discomfort and headache, and low-grade fever are not specific to mumps. These symptoms are associated with lots of different ailments.

Parotitis does not occur with all cases of mumps. It occurs in anywhere from 9%-to-94% of cases, and usually appears within 16-to-18 days after exposure. In fact, before a vaccine was available between 15% and 27% of persons who were infected with mumps had no symptoms at all.

Now this is a picture of a child with mumps. You can see the swelling in the neck - which looks like it is bilateral with swelling on both sides. Some people may only have swelling on one side. But they're still immune to re-infection with the mumps virus.

I remember looking like this. And I remember that my mother diagnosed it by having me bite a pickle. It was excruciating, and she said, "Yep. You have the mumps."

Ortitis - or swelling of the testes - is the most common complication in post-pubital males. But mumps is a rare cause of male infertility. In the pre-vaccine era, inflammation of the pancreas was an infrequent occurrence and sometimes occurred even without swelling of the parotid glands.

Unilateral deafness occurred in 1 out of 20,000 cases, but severe hearing loss on both sides was rare. And between 1966- and -1971, there were 2 deaths per 10,000 reported cases. Now, if you downloaded the slides, it said 1955 instead of 1966 - which was a typo. And there have been no mumps-related deaths in recent U.S. outbreaks.

Rubella is caused by a togavirus. You may also hear it referred to as German measles or the three-day measles. The incubation period of rubella is 12-to-23 days, but averages ~~is~~ 14-to-16 days.

There may be a prodrome, consisting of low-grade fever and malaise, and the prodrome is more common in adults than in children. The rash appears usually 14-to-17 days after exposure. Lymphadenopathy - or enlarged lymph nodes - may appear in the second week. And they can last for several weeks.

Now this is a picture of a child with rubella. You can see that the rash looks much milder than that associated with measles, and the child does not appear nearly as sick as the child with measles did in the other picture that I showed you. Complications of rubella are not common, but they generally occur more often in adults than in children.

Transient arthralgia or arthritis may occur in up to 70% of women infected with rubella. But it’s rare in children and adult males, and chronic arthritis is

rare. Encephalitis occurs in 1 in 6,000 cases, and again, this is more common in female adults than in anyone else.

The most common hemorrhagic manifestation is thrombocytopenic purpura - which is bleeding into the skin with petechiae - or red and purple spots and bruising in the skin.

These symptoms are more common in children than adults, and occur in about 1 in 3,000 cases. The other complications: orchitis, neuritis-or inflammation of nerves, and progressive panencephalitis - or inflammation of the brain that results in loss of mental and motor functions - are rare complications, and no deaths have been reported in recent outbreaks here in the U.S.

The real public health significance of rubella is not the disease itself or its complications. It is congenital infection. The virus may infect many different embryonic cell lines and may cause damage to many different organs, as you see here on the slide.

The most common is deafness, but the child may have more than one organ affected. For example, a child may be deaf, have cataracts and cardiac defects, and even mental retardation. And collectively, these abnormalities are known as congenital rubella syndrome, or CRS.

Unfortunately, the mother does not have to have symptoms to transmit the virus to her fetus. In general, the younger the fetus when infected, the more serious the damage. Up to 85% of infants born to women infected with rubella virus in the first trimester will have defects. Infection early in pregnancy may also lead to fetal death and miscarriage. CRS is rare when the infection occurs in the second trimester or later.

This is a picture of a child with congenital rubella syndrome, and you can see that the child has cataracts and likely has other sequelae from infection in utero.

I don't remember my infection with rubella, but I do remember when I was a young mother in the 1960s that my best friend had never had rubella, and she was pregnant. And we were terrified that she would be exposed or infected with rubella. Fortunately, she was not, and she delivered a beautiful baby boy.

So, let's pause for a couple of minutes so I can ask you a question. Which of the following is not one of the classic 3C's of measles? So, just click on your choice, and then we'll see how everybody did in a few seconds.

So, it looks like the majority of you selected "cataracts." And that's correct, because that's a complication of congenital rubella syndrome that can occur in infants that are born to women infected with rubella during pregnancy. The other three are the classic 3C's of measles.

So now, a little about the epidemiology of these diseases. All three are human diseases, and there are no known animal reservoirs. The primary mode of transmission is person-to-person by the respiratory route.

Airborne transmission of measles from aerosolized droplets can occur in a closed area, such as a waiting room or an exam room, for up to two hours after a person with measles leaves the area. Mumps can also be transmitted by direct contact with respiratory droplets or saliva.

The incidence of all three is highest in late winter and spring, and communicability - or the time when most transmission occurs - varies slightly,

as you can see on the slide. but is within a few days before and after rash onset for measles and rubella, and several days before and after parotitis for mumps.

The large graph on this slide shows the incidence of measles per 100,000 population in the U.S. from 1977 through 2012. In the measles resurgence that you see on the graph between 1989 and 1991, more than 55,000 cases and 123 measles -associated deaths were reported

And this was the first time that the proportion of cases in children younger than 5 years of age was larger than the proportion of cases in school-aged children. And the most important cause of the resurgence was low vaccination coverage.

You can see on the large graph that the incidence of measles declined rapidly after the resurgences, primarily due to intensive efforts to raise vaccination levels. However, you can see in the small inset graph that there has been some fluctuation in the incidence since 1997, primarily related to imported cases from other countries.

Measles was declared eliminated in the United States in 2000. Now, this means that continuous measles transmission lasting for more than 12 months was interrupted. Contributing factors included high coverage rates with the 2-dose schedule, and the high quality of measles surveillance in response to reported cases and outbreaks, and improved measles control in all of the Americas.

However, elimination does not mean gone forever or eradicated. Imported cases and limited spread occur every year, and this is certainly what we've seen in the last few years.

This CDC infographic emphasizes the risk of unvaccinated travelers being infected with measles, bringing it into the U.S., and spreading it to others who are susceptible.

Measles is still common in many parts of the world, including some countries in Europe, Asia, the Pacific and Africa.

On this graphic you can see the number of reported measles cases in the U.S. by year from 2001 through April 21, 2015. In 2011, France was experiencing a large measles outbreak, and most of the cases that were brought to the U.S. in 2011 came from France.

During 2013, nearly 2/3 of the cases in the U.S. came from three outbreaks. In these outbreaks, transmission occurred after measles was brought into communities with pockets of unvaccinated people, because of philosophical or religious beliefs. The disease spread mainly in households and community gatherings before public health intervention could be implemented.

The U.S. experienced a total of 668 cases from 27 states in 2014. There were 23 measles outbreaks, including one large outbreak of 383 cases that occurred primarily in unvaccinated Amish communities in Ohio.

Many of the cases in the U.S. in 2014 were associated with cases brought in from the Philippines, where there was a large measles outbreak. A large measles outbreak in several states linked to an amusement park in California started in late 2014 and has continued into 2015. The outbreak likely started from a traveler who became infected overseas with measles and then visited the amusement park while infectious.

Although no specific source was identified, CDC scientists did identify the measles virus type in this outbreak to be B3. And this is the virus type that caused the large measles outbreak in the Philippines in 2014. And as of August 21, 2015, there have been 188 reported cases in 24 states, and there have been five outbreaks representing 81% of cases reported in 2015.

Now this map shows which states have had the most reported cases in 2015 up through August 21st. The darker the color, the higher the number of cases. One hundred and seventeen - or about 2/3 - 62% of these cases - were part of the large outbreak linked to the California amusement park that affected several states.

Now this is an infographic that CDC developed to educate providers and patients about the risk of measles for susceptible international travelers. It can be printed from the address on the slide. And a person doesn't even have to be on the same plane with someone who is infected.

There was an *MMWR* article that was published on June 26 of this year about a man who came down with measles after he passed through an airport gate when departing a flight where an infected child was waiting at the same gate to board that plane.

As a healthcare provider, you need to be sure measles is on your radar. Be sure that all of your patients are immune to measles, as well as mumps and rubella. And if you see someone with a febrile rash, especially if they have any of the classic 3C's - cough, coryza and conjunctivitis - think measles until you can rule it out.

Ask if the patient has recently traveled internationally, if they've been in contact with international travelers, or if they've been anywhere that might be frequented by international travelers.

Or has there been a history of measles in their community? If measles is even suspected, immediately isolate the person. Because remember, measles virus remains in the area where an infected patient was for at least a couple of hours after they leave.

Now, this graph shows the incidence of mumps per 100,000 population in the U.S. by year from 1987 through 2012. You can see the significant decline in incidence after two doses of MMR was recommended in 1989 for school-aged children, primarily to improve measles control.

In 2006, there was a mumps outbreak involving more than 6,000 cases over several states, and this outbreak primarily infected Midwestern college students - especially those living in dormitories.

On this slide you can see the number of reported mumps cases by year from 2010 through August 28, 2015. You can see that school settings have been the predominant locations for these outbreaks. And even the National Hockey League was affected. These are typically settings where you have groups of people with prolonged close contact, which facilitates transmission.

Now, this slide shows the incidence of rubella per 100,000 population in the U.S. by year from 1982 through 2012. By 1983, there were less than 1000 cases per year reported. But there was a resurgence in 1990 and 1991, primarily due to outbreaks in California and among the Amish in Pennsylvania.

In 2004, rubella was declared no longer endemic in the U.S., and cases have remained low with a median of 11 rubella cases annually from 2005 through 2011. And 60% of rubella cases over the last decade in the U.S. have occurred in persons 20 through 49 years of age. You can also see on this table that the low number of CRS cases has paralleled the low number of rubella cases.

Now I know the text on this slide is small, but I wanted you to see a comparison of what is considered acceptable evidence of immunity for measles, mumps and rubella for the general population. And then the three risk groups: college and post high-school students, healthcare personnel, and international travelers.

And this table, if you're interested, is in the 2013 ACIP MMR recommendations. So, documented vaccination or laboratory evidence of immunity or laboratory confirmation of disease is acceptable evidence of immunity.

Birth before 1957 is presumptive evidence of immunity, except for rubella in women of childbearing age who could become pregnant. Now, even a few women born in 1956 who are rapidly approaching 60 years of age are bearing children, so we still need to be concerned about their rubella immunity.

So, let's look at the vaccines that protect against measles, mumps and rubella and the recommendations for their use.

There are no single measles, mumps and rubella vaccines licensed for use in the U.S. MMR is a live, attenuated vaccine that protects against all three viruses. As long as there are no medical contraindications, MMR can be used in anyone 12 months of age and older - and in certain cases, as young as six months of age, which I'll discuss in a few minutes.

The viruses in the vaccine are weakened so that they will not cause disease in a person with a competent immune system, but they will induce a protective immune response in most vaccinated persons.

Now, you can see that vaccine efficacy varies somewhat between vaccine components. And as you well know, there is no vaccine that is 100% effective. Vaccine-induced antibody titers are lower than following natural disease, but vaccine-induced immunity appears to be long-term, and probably life-long in most persons.

MMRV, brand-named ProQuad - contains measles, mumps, rubella, and varicella vaccine. The measles, mumps and rubella components are the same as in MMR vaccine. But the varicella component contains more varicella vaccine virus than varicella vaccine. It is only approved for use in persons 12 months through 12 years of age.

Although MMR vaccine is highly effective, not everyone responds to the first dose. The vaccine failure rate varies by component. Approximately 2-to-5% of children who receive only one dose of MMR fail to respond for measles and rubella, and up to 20% for the mumps component.

The reason why this small number of persons do not respond to the vaccine is not known for sure, but it's probably caused by antibody present at the time of vaccination, or mishandled vaccine that was damaged.

It could also be a result of a reporting error, and there are possibly other reasons that could cause a vaccine failure. But the good news is that vaccine failure is not permanent, and most persons with vaccine failure of the first dose will respond to a second dose.

The first dose of MMR is routinely recommended for children between 12 and 15 months of age. The minimum age for a routine dose is 12 months. Now if international travel is planned with a child who is at least six months of age, ACIP recommends that a dose of MMR be administered.

The vaccine is not routinely recommended before 12 months of age because if maternal antibodies are present, they could interfere with the vaccine. But if the child is at high risk because of international travel, there is a chance that the child may respond to the vaccine. And the vaccine won't harm the child.

However, a dose administered before 12 months of age does not count as one of the two valid doses. So it should be repeated once the child is 12 months of age, as long as 4 weeks have elapsed since the dose given before 12 months. And this is an off-label ACIP recommendation to administer the vaccine between 6 and 11 months of age.

Now the second dose is routinely recommended at four-to-six years of age. But it's considered valid as long as it's given 4 weeks - or 28 days -after the first dose. If international travel is planned with a child older than 12 months of age, the second MMR dose should be given as long as 4 weeks have elapsed since the first dose.

The four-day grace period does apply between two doses of MMR, but the grace period should not be used to schedule appointments. It's primarily used for record review when deciding if doses are valid.

Of course, if there's a school law that requires a dose on or after the fourth birthday, then another dose should be administered. The second dose is not

really a booster dose, although it may boost the antibody titer in those who responded to the first dose.

As I said, the main reason for the second dose is to produce immunity in persons who didn't respond to the first dose. And people who receive two doses of MMR vaccine as children are considered to be protected for life and do not need booster doses.

Both MMR and MMRV are approved for use as the first and second doses for children 12 months through 12 years of age. CDC recommends that providers discuss the benefits and risks of both options with parents or caregivers. Unless the parent or caregiver prefers MMRV, CDC recommends using MMR and varicella vaccines for the first dose, and MMRV is generally preferred for the second dose.

So here is the specifics of CDC's recommendation, which is based on available data that there is a slight increased risk of febrile seizure for young children if the first dose is given as MMRV. And I'll discuss the details of this data when we get to the vaccine adverse reactions section.

So for the first dose, at 12-through-47 months of age, either MMR or MMRV can be used. Providers who are considering administering MMRV for the first dose in this age group should discuss the benefits and risks of both options with the parents or caregivers.

Unless the parent or caregiver has a preference for MMRV, CDC recommends that MMR and varicella vaccines should be administered at separate sites for the first dose in children 12-through-47 months of age. For the second dose, at 15 months through 12 years of age, or if the first dose is being given at 48 months of age or older, MMRV is generally preferred.

I also want to point out the minimum intervals between doses of these two vaccines. As I previously mentioned, two doses of MMR can be separated by 4 weeks or 28 days. Two doses of varicella vaccine must be separated by at least 3 months in children younger than 13 years of age.

So that means two doses of MMRV should be separated by at least three months. Also if varicella vaccine is used for the first dose, and MMRV is the second dose, then they need to be separated by at least three months. And remember, MMRV is only for persons 12 months through 12 years of age.

So here's the 2015 recommended childhood/adolescent schedule. Measles, mumps and rubella is outlined in red. The purple bar represents the range of recommended ages for vaccination of certain high-risk groups.

So this represents the dose that can be given to children 6-through-11 months of age if international travel is planned. The yellow bars represent the range of recommended ages for vaccination of all children.

So the first dose is recommended between 12 and 15 months of age, and the second dose between 4 and 6 years of age. The green bars represent the range of recommended ages for catch-up vaccinations.

So if children didn't receive the first dose by 15 months of age, then they should be caught up on that dose as soon as possible. And the same holds true for those who did not receive the second dose by six years of age.

Now adults born in 1957 or later need one dose or more of MMR unless they have other evidence of immunity. If they are at high risk for exposure - which includes college and post-high school students, any persons working in

medical facilities, and international travelers, then they need 2 doses separated by at least 28 days.

And as I mentioned earlier, adults born before 1957 are generally presumed immune to measles, mumps and rubella unless they are of childbearing age and could become pregnant.

Now, the *MMWR* shown on this slide includes the recommendation for vaccination of healthcare personnel. As far as measles, mumps and rubella, this refers to all persons who work in medical facilities. Anyone who breathes air in the facility should be immune to these very contagious viruses - not only to protect themselves, but to prevent the risk of transmitting infection to others.

So, for healthcare personnel born before 1957 who are unvaccinated and lack laboratory evidence of immunity or laboratory confirmation of disease to these three viruses, CDC has made the following recommendations: consider vaccinating with two doses of MMR to protect against measles and mumps and one dose of MMR to protect against rubella.

Now, we only use MMR in this country, so now even if you're vaccinating for rubella along with measles and mumps, you're going to end up with two doses.

If there's an outbreak, then CDC's language is stronger. Instead of "consider," CDC "recommends" vaccinating with two doses of MMR for measles and mumps and one dose for rubella.

Now, for healthcare personnel born in 1957 or after, they should have one of the following as evidence of immunity: documented vaccination with two

doses of a live measles and mumps-containing vaccine - preferably MMR, and one dose of live rubella-containing vaccine - again, preferably, MMR.

But they may, you know, come in with a record from another country where they received single antigens, so that's why you see the language written the way it is.

Or they can have laboratory evidence of immunity or laboratory confirmation of disease. Now notice, these are all "or," not "and." So if they have any one of the three, then that's considered to be evidence of immunity.

So, here is the 2015 adult schedule based on age. Again, measles, mumps and rubella are outlined in red. The yellow bar representing the recommended ages for vaccination of all adults covers those born in 1957 or after, with one or two doses. And the white space means that there's no routine MMR recommendation for persons born before 1957.

The second adult schedule is based on risk factors or occupations, and you see measles, mumps and rubella again outlined in red. Now, there's a red bar and this means that since MMR is a live vaccine, it is contraindicated during pregnancy for those with immunocompromising conditions and persons who are HIV-positive, if they are severely immunosuppressed, based on their CD4 T-cell count.

Otherwise it's the yellow bar, indicating that persons with these other conditions - and you'll see the last column, again, is healthcare personnel - and that's the one for occupation - that they can receive MMR vaccine one or two doses, as indicated.

Now, some people have been vaccinated, but they need to be re-vaccinated with at least one dose of MMR, and here are those groups: anyone that's been vaccinated with a dose before the first birthday, that dose is invalid. Anyone vaccinated with killed measles vaccine or vaccinated from 1963 through 1967 with an unknown type of vaccine.

Or if they were vaccinated with immune globulin in addition to a further attenuated strain, or with an unknown type of vaccine. Now, re-vaccination is not necessary if they received immune globulin along with Edmundson B vaccine. Now, there's more information about the different strains and when they were available on Page 217 in the Pink Book.

Now, if a person already has documentation of any of the following, then there's no need to do serologic testing. Again, documentation of appropriate vaccination, or laboratory evidence of immunity, or laboratory confirmation of disease. They are considered immune. And post-vaccination serologic testing to verify immune response is not recommended. Documented age-appropriate vaccination trumps serologic testing.

Now, if for some reason the person is tested and has two documented doses of measles or mumps-containing vaccine followed by a negative or equivocal titer, then CDC does not recommend additional doses of MMR. Documented vaccination should be accepted as evidence of immunity.

Commercial tests are not sensitive enough to measure a low antibody titer, although immune memory may be present, so it's likely to indicate a false negative.

Now if a person who has one dose of rubella-containing vaccine - and the titer is negative or equivocal, then CDC does not recommend additional doses of

MMR unless the woman is of childbearing age. If the woman has one or two documented doses of rubella-containing vaccine, then one additional dose of MMR vaccine should be administered, and no further testing is recommended.

So the maximum number of rubella doses that a woman of childbearing age with a negative or equivocal titer should receive is three doses.

Now, MMR vaccine may protect or modify the infection if MMR is given within 72 hours of measles exposure for persons 12 months of age or older. Immune globulin can be used for measles post-exposure prophylaxis of non-immune persons if it's given within six days of the exposure.

And IG is not recommended for anyone who is 12 months of age or older if they've received a dose of measles-containing vaccine, unless they are severely immunocompromised. And the 2013 ACIP recommendations for MMR has more detailed guidance on post-exposure prophylaxis for measles. Now, post-exposure prophylaxis with MMR or immune globulin has not been shown to be helpful following exposure to either rubella or mumps.

So let's pause again, and have you answer this question: a healthcare provider has two documented valid doses of MMR. At the time of employment, her antibody titers are positive for mumps and rubella but negative for measles. So does ACIP recommend a third MMR in this case? So, go ahead and select yes or no, and then we'll see how everybody did.

Well, the majority of you got this one correct. The answer is no. Two documented doses of MMR trumps the results of serologic testing.

Now MMR - including MMRV - is contraindicated if someone has a history of a severely anaphylactic type reaction to neomycin or any component in the

vaccine or to a prior dose of the vaccine. Now, this does not include eggs, but it does include gelatin. MMR should not be administered during pregnancy. And I'll talk a little bit more about this in a moment.

Immunosuppression is generally a contraindication to a live-virus vaccine, but I am going to talk about some exceptions on a later slide. If someone has a moderate or severe acute illness, they should not be vaccinated until their condition improves.

Receipt of an antibody-containing product could interfere with the immune response to the vaccine. And the length of time to allow for these antibodies to clear the person's system before vaccination depends on the concentrations and quantity of the product that was administered.

And there's a table of recommended intervals between antibody-containing products and measles-containing vaccines on Page A-24 of Appendix A in the Pink Book. And this table is also published in the ACIP general recommendations on immunization. A personal or family history of seizures for any reason is a precaution for MMRV - and again, I'll discuss this a little more later.

MMR or MMRV should not be administered to women who are known to be pregnant or attempting to become pregnant. ACIP recommends that a patient of childbearing age be asked if they are pregnant or likely to become pregnant within the next four weeks. If the answer is yes, the woman should not be vaccinated during pregnancy, or if trying to become pregnant.

Because there is a theoretical risk to the fetus when the mother receives a live-virus vaccine, women should be counseled to avoid becoming pregnant for four weeks after receiving MMR vaccine. Now the package inserts

recommends deferral of pregnancy for three months after vaccination. But ACIP's off-label recommendation is four weeks.

If the vaccine is inadvertently administered to a pregnant woman or a pregnancy occurs within 28 days of vaccination, she should be counseled about the theoretical risk to the fetus.

Now there have been no reports of vaccine-related harm to a fetus because of inadvertent vaccination during pregnancy. So MMR vaccinations during pregnancy should not be considered an indication for termination of pregnancy.

As I showed earlier in the adult schedule based on risk, MMR vaccine can be administered to persons who are HIV-positive but do not have current evidence of severe immunosuppression. Re-vaccination is recommended for persons with perinatal HIV infection if they were vaccinated before effective anti-retroviral therapy - or ART - was started.

Once effective ART has been established with the patient, two appropriately-spaced doses of MMR should be administered. Pre-vaccination HIV testing is not recommended before vaccination. And MMRV should not be used for anyone who is HIV-positive. If vaccination is indicated, only use MMR.

MMR vaccine should not be given to persons taking large daily doses of oral or parenteral corticosteroids for more than two weeks, and vaccination should be avoided for at least one month after high-dose therapy is stopped.

Patients with leukemia in remission who have not received chemotherapy for at least three months may receive MMR. For someone who has received a

hematopoietic cell transplant or bone marrow transplant and is immunocompetent, MMR can be administered 24 months after the transplant.

Now for time's sake, I'm going to refer you to the Pink Book, Page 223 for more detail, and there is also a rather extensive discussion of vaccination and immunosuppressive therapy in the ACIP general recommendations on immunization.

Now, measles disease can cause someone with a latent TB infection to develop active TB. But measles-containing vaccine does not cause this. So tuberculin skin testing is not a prerequisite to vaccination with MMR.

A tuberculin skin test or tuberculosis interferon gamma release assay - or IGRA - can be applied before or on the same day that MMR or MMRV vaccine is given. However, if the MMR or MMRV is given on the previous day or earlier, then the tests - the (tuberculin) tests - should be delayed for at least 28 days.

Live measles-containing vaccine given prior to the application of the tests can reduce the reactivity of the tests because of mild suppression of the immune system. Now you know, tuberculin skin tests -we now refer to it as TST - but we previously called it PPD.

Now, since all three components of MMR are live viruses, adverse reactions following vaccination are predictable and represent viral replication that leads to mild illness in susceptible vaccine recipients.

Adverse reactions generally occur 7-to-10 days after vaccination. The most common reaction following vaccination is a low-grade fever in about 5-to-

15% of recipients, which is usually attributed to the measles component, and MMR might cause febrile seizures.

On a later slide I mention that the risk is approximately 1 case for every 3,000-to-4,000 doses of MMR vaccine administered. And the rate is almost twice that for MMRV.

A rash occurs in about 5% of recipients and lasts a day or two. It's usually attributed to the measles component, but rubella vaccine virus can also cause a rash. The rash is much milder than the rash that occurs with disease.

Now I mentioned earlier with disease - and it can also occur with the vaccine - joint symptoms, which can occur in up to 25% of rubella-susceptible women, less in men and rarely in children. And I've got more about this on an upcoming slide.

Thrombocytopenia - or low platelet count - occurs in 1-in-30,000-to-40,000 doses, and is usually transient and benign. Parotitis and deafness are rare reactions, usually attributed to the mumps component. And encephalopathy is believed to occur after 1 in a million doses or less. So this is a very rare event.

Now joint symptoms occur in up to 25% of rubella-susceptible women. Less in men, and like I said, rarely in children. The most common joint symptoms reported after rubella or MMR vaccination are joint pain and frank arthritis - like joint swelling and redness, which occur in about 10% in the vaccine recipients compared to 70% of women after rubella disease.

Symptoms usually occur between 1 and 3 weeks after vaccination, and last between 1 day and 3 weeks, and rarely recur. There have been some reports of persistent pain or chronic arthritis in women who received the rubella vaccine.

However, several large studies have not found an association between chronic joint symptoms and rubella vaccination.

Now, almost everyone becomes immune to rubella after the first dose. So in the instances where a second or third dose is administered, only the small number of women who failed to respond to the first dose would be at risk for joint symptoms.

Now, to date, there is no convincing evidence that any vaccine causes autism or autism spectrum disorder. Two independent non-governmental groups, the Institute of Medicine and the American Academy of Pediatrics reviewed the evidence, and both groups independently concluded that available evidence does not support an association between autism and MMR vaccine and that the U.S. should continue its current MMR vaccination policy.

Adverse reactions following an MMRV are similar to MMR. However, compared to vaccination with MMR and varicella vaccine at the same visit, MMR vaccination is associated with a higher risk for fever and febrile seizures 5-through-12 days after the first dose among children 12-through-23 months of age.

Fever of 102 degrees or higher within 42 days was reported in 22% of MMRV recipients compared to 15% of those who received separate injections of MMR and varicella vaccine.

The increased risk of fever following MMRV also results in an increased risk for febrile seizure. And this is estimated to be about one additional febrile seizure for every 2300-to-2600 MMRV doses administered to children 12-through-23 months of age. An increased risk of febrile seizures has not been

observed following use of MMRV as the second dose in the MMR and varicella series.

Studies have suggested that children who have a personal or family history of febrile seizures or family history of epilepsy are at increased risk for febrile seizures compared with children who don't have such a history.

Children with a personal or family history of seizures generally should be vaccinated with separate MMR and varicella vaccines rather than MMRV, because the risk of using MMRV vaccine in this group of children generally outweighs the benefit of MMRV vaccine.

Now those of you that know me know I rarely do a presentation without reminding you about the importance of proper vaccine storage and handling. MMR vaccine can be stored with other refrigerated vaccines or in the freezer. The diluent can be refrigerated or stored at room temperature, but it should never be frozen.

Now, MMR is a live vaccine so it should be protected from light by keeping it in the original packaging until ready to administer. And once it is reconstituted with the diluent, the vaccine should be used as soon as possible.

Store the reconstituted vaccine in the vaccine vial in a dark place in the refrigerator, and discard it if it is not used within eight hours. And you should not draw the reconstituted vaccine into a syringe until you are ready to administer it.

Now because MMRV contains varicella vaccine virus, it should be stored with other varicella-containing vaccines at the recommended freezer temperature. It should never be stored -even temporarily - using dry ice. If removed from

the freezer, it can be stored for up to 72 continuous hours at refrigerator temperature, but if it's not used by then, it has to be discarded. You can't return it to the freezer.

It also needs to be stored in the original packaging and protected from light until you're ready to administer. And it needs to be used within 30 minutes of reconstitution or discarded. And never freeze reconstituted vaccines.

The diluent for MMRV is the same as for MMR, and store it at room temperature or refrigerated and don't freeze the diluent - don't freeze any diluent.

Now on this slide I've included links to more information about the most recent measles outbreaks, and on this slide you'll find information about the ACIP - links – to the ACIP recommendations for measles, mumps, rubella, and also for MMRV.

And then the last resource page contains links to information and resources that are on the Immunization Action Coalition and Children's Hospital of Philadelphia Vaccine Education Center Web sites. And with that, it's your turn to ask questions, so I'm going to turn things back over to Dr. Strikas.

(Raymond Strikas): Thank you very much, Miss (Weaver) for that thorough and comprehensive presentation.

So to get yourself lined up to ask questions, please dial Star 1 on your telephone to get in the queue for questions, and I'm also going to go over some CE information for you so you can get credit for participating in today's program.

So the recast and the slide set - the slide set's already available - but the recast will be available at www.cdc.gov/vaccine/ed/ciinc will be available next week - the week of September 21, 2015. That is for the recast. The slides are already there.

For continued education credit, as I mentioned, the Web site's (alone) but here it is again: www.2a.cdc.gov/tceonline/.

The course number that is specific for today's program is E as in Edward - C as in Cat - 2064-091615 - that's today's date. Again, EC2064-091615. You need that date-specific (sent to you) completing CE requirements for today's program. The verification code specific for today's program only is MMR11. That MMR11. And the CE credit expires October 19th this year, 2015.

Okay, so I think we're ready to take questions. Let me ask the operator if we have any questions waiting for us.

Coordinator: We do, and our first question comes from (Amy Hase). Ma'am, your line is open.

(Amy Hase): Hi. Just want to thank you for the presentation, and I had several questions, and you answered most of them.

I do work in occupational health, and I have several employees who come to us with absolutely no shot record. So my question is, regardless of age of those individuals, is it best to titer them or best to just vaccinate with the two MMRs?

(Donna Weaver): Well, you have the option of testing or vaccinating. But frankly, it's probably just easier to vaccinate with two doses, because, you know, the expense of testing - and then if it comes back negative, you've got to vaccinate anyway.

And if there's - you know, if they don't have any documentation of having disease or of vaccination, then you really need to do something, especially for those born in 1957 or after. And like I said, the recommendation on those born before '57 - if we're talking about healthcare personnel - is to consider vaccination and of course, if you've got an outbreak, then it's recommended that you do.

So you really have either option but, you know, you could end up having to do both, and taking more time and more expense if you test.

(Raymond Strikas): Thank you. Did you have an additional question?

(Amy Hase): I think that's it. Thank you so much.

(Raymond Strikas): Thank you.

(Donna Weaver): I was really glad to hear, (Amy) that you said we did answer most of your questions. Thank you for telling us that.

(Amy Hase): Yes, your presentation was very, very through.

(Raymond Strikas): Thank you.

Operator, more questions?

Coordinator: Yes. Our next question comes from (Deborah Schultz). Your line is open.

(Deborah Schultz): Thank you, (Donna), this is an excellent presentation. And my question to you is, if you receive the MMR vaccine and you develop a rash, would you be considered contagious at all?

(Donna Weaver): No. If it's, you know, a mild rash - and typically within - what was it I said? I think I said 7-to-10 days after the vaccine - then they're not considered to be infectious. That's just part - you know, I mean, you're actually giving them a live vaccine. It is weakened, but part of that immune response that has to occur is that mild infection, really, that then allows them to mount that immune response and develop those antibodies.

(Deborah Schultz): Okay. Thank you.

(Donna Weaver): And you really don't need to worry about them being infectious.

(Deborah Schultz): All right. This was great. Thank you so much.

(Donna Weaver): Thank you.

(Raymond Strikas): Our next question, operator?

Coordinator: Comes from (Brittany). (Brittany), your line is open.

(Brittany): Hello, thank you. I just had a quick question for you regarding MMR storage from freezer to fridge. Is MMR only good for 72 hours after you remove it from the freezer? Or can you just clarify that a little bit for me?

(Donna Weaver): Yeah, (Brittany). That's a good question. Thanks for asking that. One of my favorite subjects, storage and handling. Talk about it a lot.

Well MMR can be stored in either freezer or refrigerator, so you don't have to worry about that 72-hour issue with that. In fact, if it's been in the freezer, it could go back - I mean if it's been in the refrigerator, it could go back into the freezer, since either place is acceptable, as long as it's within those recommended temperature ranges for freezer or refrigerator.

Now MMRV is different because it's got the Varicella virus in it. That's why it has to be stored in the freezer, and you have that 72-hour continuous time limit when it's put in the refrigerator. So that one's different. The MMRV or ProQuad is different.

(Brittany): Okay, thank you. I did not catch the MMRV part of that, and I was...

(Donna Weaver): Well, you know, I don't know. The way I was talking along, maybe I forgot to say V. I'm sorry. But I hope that clarifies for everybody.

(Brittany): It does. Thank you so much.

(Raymond Strikas): Thank you. Operator, another question?

Coordinator: Sure. The next one comes from (Carol McKay-Mitchell). Your line is open.

(Carol McKay-Mitchell): Yes. First I must say what an excellent presentation. Very detailed. And my question - I have two questions. One is, how long do we have to wait after the MMR administration to administer a TST test or the PPD?

And my second question, according to evidence base, which vaccine is more preferable between the ages of 12 months to 12 years? The MMR first? Or the MMRV? Because some of the doctors think that the MMRV causes febrile

seizures. They prefer to give MMR first instead of the MMRV. What is your take on this?

(Donna Weaver): Well thanks, (Carol). Your first question was about if they got the vaccine first, and then you're going to administer tuberculin skin test, then you need to wait at least four weeks before you administer the tuberculin skin test, because it can impact it.

Now if you give the tuberculin skin test first, and they're not given on the same day, then when they come back to have the test read, you can - once you read the test, you can go ahead that day and give them the MMR.

Now you asked about which is preferable in terms of MMR or MMRV. I did mention that there is increased risk for febrile seizures, especially in those young children through 23 months of age. That's where the data was in those first few days after receiving MMRV.

So the recommendation is, unless the parent really has a preference for MMRV, then when you're giving that first dose of vaccine to those children up through 12 months through 47 months of age, it's preferable that you use the MMR and the Varicella vaccine separately -- two separate injections.

Now if it's the first dose for a child who's 48 months of age or older, or it's the second dose, then generally you can say that MMRV is preferred, unless the clinician feels there's just some really specific reason that there's an increased risk, again, for febrile seizure. But the data really is after - in those young children after the first dose.

And again, this is mentioned in the Pink Book, and my slides are posted with that information on it so you can review it. Because I know this gets detailed,

and trying to keep all this in your head is not possible. So does that help with those two?

(Carol McKay-Mitchell): Yes, thank you so much, and I really do appreciate the presentation on immunizations. It was excellent.

(Donna Weaver): Well you all are making my day. Thank you so much.

(Raymond Strikas): Thank you very much. Operator, do we have more questions?

Coordinator: We certainly do. And the next question comes from (Emily Norris). Your line is open.

(Emily Norris): Hi, yes. My question is, if the full dose was accidentally excreted from the syringe, do to like a child jerking or something, when do you repeat the dose, since it's a live vaccine?

(Donna Weaver): So they got part of the dose but not all of the dose? Some of it leaked out of the syringe. Is that what you're saying, (Emily)?

(Emily Norris): Yes.

(Donna Weaver): Okay. Well if it's a live vaccine, then since they got part of it, we recommend that you wait four weeks to repeat it. If it's inactivated, you can go ahead and repeat it that day.

(Emily Norris): Okay, thank you.

(Raymond Strikas): Thank you. Next question, please?

Coordinator: Next question comes from (Trish Cleary). Your line is open.

(Trish Cleary): Yes, (Donna), I missed most of your presentation. I'm sorry about that, but I'll catch it on the recast. My question is, at our clinic we assess for antiviral usage prior to Varicella. We don't need to assess for that prior to MMR. Am I correct on that?

(Donna Weaver): Not that I know of. Dr. (Strikas), do you agree?

(Raymond Strikas): Yeah, I'm not aware of any really effective antivirals to treat measles, mumps and rubella unfortunately. But in this case, it makes your life simpler that there's no antiviral commonly used that would affect the growth properties of those vaccine viruses.

(Trish Cleary): Thank you. I appreciate it.

(Raymond Strikas): Thank you. Next question, operator?

Coordinator: Our next question comes from (Megan). Your line is open.

(Megan): Hello. I am calling with more of a housekeeping question. I was trying to get the credit online. It appears that the verification code isn't working, so I was wondering if you could look into that and then maybe email that to everybody, what's going on with it, when you get a minute.

(Raymond Strikas): Thank you.

(Donna Weaver): (Megan), you say the verification code didn't work. It was MMR11, MMR one one. So did you capitalize the MMR? I think it's case sensitive. Is that true?

(Megan): I did, yeah. And I've gotten credit from all of the Pink Book Webinars and a number of other CDC presentations, so I do know the system. But for whatever reason, it doesn't seem to be working, for me anyway.

(Donna Weaver): Okay, (Melissa), our CE person, said that she did check to make sure that MMR11 does work. It does, and it is case sensitive. But if you're still having trouble, any of you, you can email N-I-P info at C-D-C dot gov. N-I-P info at C-D-C dot gov. And (Melissa) will get those questions, and then be able to help you.

And, if you have any other questions regarding today's presentation that we, you know, don't get to within our time, or you think of them afterwards, don't hesitate to email us at NIPInfo.

(Megan): Okay, thank you. And thanks for the great presentation. I've liked all of them, but this was the best one so far.

(Donna Weaver): Oh, my goodness. Thank you, (Megan).

(Raymond Strikas): Thank you. We'll have to bring (Donna) back for an unscheduled visit. Operator, do we have more questions?

Coordinator: We do. Are you ready for the next one?

(Raymond Strikas): Yes, please.

Coordinator: (Jessica Sales), your line is open.

(Donna Weaver): Hi, (Jessica). Are you there?

(Jessica Sales): Yes, I'm here. Can you hear me now?

(Donna Weaver): Yes.

(Jessica Sales): Okay. My question is, if you have a person that was born in '56 or, you know, prior to that, and they are assumed to have the immunity, but we draw titers and it's shown that they do not have immunity, should we vaccinate?

(Donna Weaver): Well it certainly wouldn't hurt. It's not going to harm them.

(Raymond Strikas): Depends on the risk, I think.

(Donna Weaver): Yeah. And if they're at risk. I mean if you're talking about a healthcare provider or someone who works in a healthcare facility, I certainly would consider it. Or if they're going to be traveling internationally, or say they work in a, you know - or going back to college, something like that. Then I think, like Dr. Strikas said, risk has something to do with it.

(Jessica Sales): Okay, all right. Thank you.

(Raymond Strikas): Operator, next question?

Coordinator: And the next question comes from (Amy Hess). Your line is open.

(Amy Hess): Hi. One more question. As far as proof of a shot record, does the CDC give any guidelines as far as what is acceptable for us to take from an employee? I have several employees bring me documentation from their high school, and I just want to make sure that the CDC does say that's appropriate documentation of vaccination.

(Donna Weaver): As far as I know, it would be. I mean, you know, if it's got the vaccines that were given- and the dates, and it doesn't look, you know, suspicious, because probably what's happened is, you know, the school required them to produce evidence of immunity. And so if they've got that on their records, and it's from the school, you know, I wouldn't see a problem with that.

(Amy Hess): Okay. A lot of times I find that they're lacking the lot number and expiration number, you know, from the actual vaccine. But it does come from the school, and I agree with you. You know, they probably presented that initially to the school. It was transferred to a different document. And then that information's been lost.

(Donna Weaver): And that reminds me, (Amy), there's a place on our Website. And if you can't find it, you can always email us at NIPInfo. And they send it to me and I'll tell you. But there's a place on our Website where it tells you how to find your immunization record if you can't locate it.

(Amy Hess): Okay.

(Donna Weaver): And that gives you different suggestions. And I really think that school records are listed there. You know, in the - what, 15-plus years that I've been here at CDC, we get emails from people that say, my name is such and such; my address is such and such. Please send me my immunization records. And they think we have file cabinets or a database that has everybody's immunization records in it, and we don't.

But, you know, also now with the registries in states, that's going to increasingly be more and more helpful. But take a look at that Website, because that'll tell you where we recommend people go to look for their

record, if they can't find it. And I'd be willing to bet that school records are on there.

(Amy Hess): And can you provide me with that Website again?

(Donna Weaver): Well I don't have it off the top of my head. So just email us at N-I-P info at C-D-C dot gov, N-I-P info at C-D-C dot gov, and we'll give you that specific Website.

(Amy Hess): Okay. N-I-P info at C-D-C dot gov.

(Donna Weaver): Yes, ma'am.

(Amy Hess): Okay, thank you so much.

(Donna Weaver): Okay.

(Raymond Strikas): Okay, operator, we can do a couple more questions.

Coordinator: Okay. The next question comes from (Chris). Your line is open.

(Chris): Hi, good morning. Hello?

(Donna Weaver): Hi. (Chris)?

(Chris): Hi, quick question. When we give live vaccines like MMR and Varicella, how long do we have to wait before we can tell the patient to come in to receive the inactivated vaccine?

(Donna Weaver): Oh, there's no waiting time. You can give the inactivated vaccines on the same day, or any day before or after they receive live vaccines. The only time you have to be concerned is like with the - you know, with the live (parenteral) vaccines, if they're not given on the same day, then you need to separate them by four weeks.

And all of that - there's a nice little table. I'm not sure it's in the Pink Book, but I know it's in the ACIP general recommendations. There's a nice little table that talks about the intervals between live and live, or inactivated and live, and inactivated and inactivated. And that's a nice one to print out and post up for your staff.

(Chris): Where can we find it?

(Donna Weaver): It's in the ACIP general recommendations, which are on our Website under - there's a section for recommendations, ACIP. But again, whenever you can't find anything on the Website, email us at N-I-Pinfo at C-D-C dot gov, and we are glad to help you find things and navigate our Website.

(Chris): Okay, thank you.

(Donna Weaver): You're welcome.

(Raymond Strikas): Okay, one more question we can do. Operator, we have one more?

Coordinator: Yes, we do, and that's from (Jane Berthen). Your line is open.

(Jane Berthen): Hello.

(Donna Weaver): Hi, (Jane).

(Jane Berthen): My question has got to do with healthcare workers. I'm employee health nurse at a hospital. We employ about 2,500. And I'm new to this facility. And my question is, if we have a new employee who has titers from three years ago, ten years ago, twelve years ago, as long as those titers were positive for measles, mumps, rubella or Varicella, are those acceptable lengths of time?

(Donna Weaver): Yes.

(Jane Berthen): Okay.

(Donna Weaver): And if they've got an immunization record, you know...

(Jane Berthen): Right.

(Donna Weaver): That's...

(Jane Berthen): I did have one said they had their little baby book. And I wasn't sure if I should take that or not -- the little baby immunization book that they give to the, you know, parents, when the children are getting their vaccines. Would you consider that acceptable documentation?

(Donna Weaver): Well we certainly recommend that parents keep a record. So if they've got those doses and dates documented, that's where a lot of parents keep that.

(Jane Berthen): Okay, great. Thank you so very much.

(Raymond Strikas): Okay. Well thank you. I'm sorry, that's all the time we have for questions today. But as (Donna) said several times, if you have additional questions for us, please email us at N-I-P-I-N-F-O, NIPInfo, at C-D-C dot G-O-V, and we'll

try to answer your questions as quickly as we can, and whether they're about MMR, which is what today's program was.

And please indicate if there was any issue with today's program, as one of our colleagues said, whether it be verification code or other things about CE, we'd be happy to answer those questions as well.

So again, let's recap what you need to know for CE credits. You need to go to the Website I mentioned several times, www.2a.cdc.gov/tceonline/. The course number for today is E as in Edward, C as in cat, 2064 dash 091615. That's today's date.

It's a date-specific extension for today's program. EC2064-091615. The verification code, which we are double-checking to make sure it works is, all capitals, M-M-R-1-1. Again, all caps, case sensitive, M-M-R-1-1. And CE credit expires in about one month, October 19, 2015.

For help with the online CE system, if you need assistance you can either email C-E at C-D-C dot gov, or call 1-800-41TRAIN, T-R-A-I-N. And phone number is staffed between 8:00 am and 4:00 pm Eastern time.

If you have questions, again we'll tell you the email address in case we said it too quickly or you missed it -- N-I-P-I-N-F-O at C-D-C dot gov, about this program or any immunization question you have you'd like us to try to address.

If you want to call us, you can call our main phone number, 1-800-CDC-INFO, C-D-C-I-N-F-O, between 8:00 am and 8:00 pm Eastern time, Monday through Friday, and trained staff are there to answer your questions. And if

they can't answer them, they'll refer it to the immunization specialist in our group.

Additional resources. You know about the Pink Book which is at the Website listed. That's why you're here, but you already know about it. Our home page is at www.cdc.gov/vaccines. And CDC immunization resources for you and your patients are at the Website there listed. We are available at Twitter at CDCIZLearn. And that's all the information we have for today.

We've got another Webinar next week. Please join us then as we wrap up this series in the next month. And thank you very much from Atlanta, and have a great day.

Coordinator: This concludes your conference call, and you may disconnect. Once again, your conference call has ended, and you may disconnect. Thank you for joining.

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